

LAKES ASSESSMENT

Background

Maine's lakes were born some 12,000 years ago, the result of the scraping and melting of retreating Ice Age glaciers. The beautiful settings and overall quality of our lakes make them natural treasures. They are, simply put, irreplaceable. Maine's lakes provide drinking water, a refuge for wildlife, and a valued recreational resource that contributes millions of dollars to our tourist economy.

Lakes naturally accumulate sediments and nutrients. This normal process of lake aging is called **natural eutrophication** and takes place over a very long period of time, usually many hundreds of years. However, humans have the ability to accelerate this process thereby shortening the time it takes for a lake to die. When human activity accelerates a lake's change, it is called **cultural eutrophication**, the result of many individual actions whose impacts accumulate over time. The primary reason for cultural eutrophication is watershed land use, including development.

The most serious problem for Maine lakes is phosphorus pollution, the major cause of cultural eutrophication. Phosphorus is a natural element found in soil and in lake sediments. Fertilizers, detergents, manure, and sewage contain concentrated phosphorus that can be carried into lakes by **stormwater** (rainwater runoff). When roads, houses, and lawns replace forested terrain, the flow of rainwater increases carrying with it additional and sometimes destructive amounts of phosphorus and sediment.

Once in a lake, phosphorus nourishes algae and allows the algae to multiply into a "bloom". When the algae die, they fall to the bottom, decompose, and deplete oxygen in the process. There are two serious consequences of oxygen depletion. First, loss of oxygen kills the cold water species such as trout and salmon living near the bottom. Second, the loss of oxygen causes a chemical change to occur in lake sediment that frees additional phosphorus to feed the bloom. Any lake or pond in bloom loses its appeal for swimmers and boaters and property values may plummet. The "it will never happen to this lake" attitude is all too common. There is usually no indication of a water quality problem to the casual viewer until an algae bloom occurs, at which point it becomes far more difficult to correct than it would have been to prevent. Caring for Maine lakes begins in our own back yards.

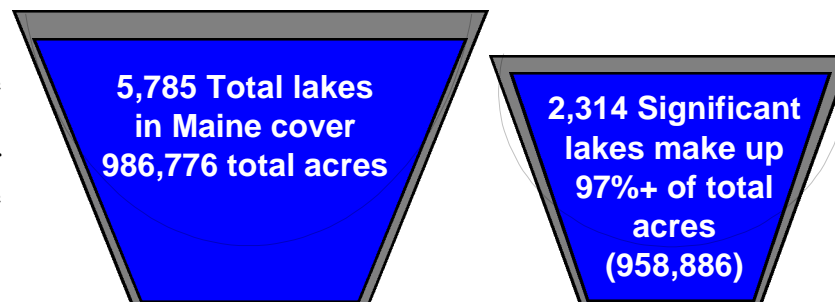


Assessment

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The Maine goals for the management of lakes and ponds under the Maine Water Classification Program include: stable or decreasing algae growth (stable trophic state), freedom from algae blooms created as a result of human activity, and no impairment of aquatic habitat. Lakes failing to support these conditions are considered impaired for their designated uses.

Water quality statistics presented in this section, except those under the topic "Acid Effects on Lakes", are based on the acreage of "significant" lakes rather than the acreage of all lakes. "**Significant lakes**" are larger lakes that have been assessed for the complete 305(b). The chart at the right shows that this number is less than half the total number of all lakes, but makes up the majority of the total acreage.



Trophic Status of Significant Lakes.

<u>Status</u>	<u>Number of Lakes</u>	<u>Acreage of Lakes</u>
Total	2,314	958,886
Assessed	1,733	926,878
<i>Oligotrophic</i>	142	121,801
<i>Mesotrophic</i>	989	625,616
<i>Eutrophic</i>	602	179,461
Unknown	581	32,008

Trophic Status

Class GPA waters are described by their **trophic state** based on criteria such as chlorophyll and phosphorus content, and Secchi disk transparency. The table at the left summarizes trophic status of 1,733 significant Maine lakes. Oligotrophic lakes are characterized by low productivity (characterized by low algal growth) and above average transparency. Mesotrophic lakes have moderate productivity and average transparency. Eutrophic lakes are highly productive (characterized by high algal growth), have below average transparency, and some may support nuisance algal blooms. Some lakes in Maine are naturally eutrophic and may not violate designated uses.

Status of Designated Uses in Significant Lakes by Major Drainage Basin: number(acreage)

Basin	Lakes Fully Supporting Designated Uses	Lakes Partially Supporting Designated Uses		
		Swimming ¹	Aquatic Life ² Support	Increasing Trophic Trend
Penobscot	702 (238,651)	3 (646)	23 (16,008)	0 (0)
E. Coastal	423 (164,418)	6 (8,390)	38 (43,577)	1 (1,702)
Kennebec	381 (145,132)	23 (27,303)	48 (47,847)	4 (18,467)
St. John	223 (64,098)	11 (10,986)	20 (24,310)	2 (2,583)
Androscoggin	161 (56,822)	4 (2,348)	30 (25,746)	1 (432)
W. Coastal	177 (49,794)	4 (288)	50 (25,568)	3 (2,250)
All Basins	2,066 (719,298)³	51 (49,961)	209 (183,056)	10 (23,732)

1. Lakes that have experienced two or more seasons with algal blooms.
2. Lakes experiencing low dissolved oxygen. Due to combination of both natural or man-made causes.
3. Four lakes not currently assigned to any drainage basin are included in the total.

Of the 5,785 lakes in the state, 3,471 have not been assessed. Despite the large number, the "unassessed" lakes make up only 2.8% of the 986,776 acres of all Maine lakes. Based on professional judgement, most of the lakes which have not been assessed are very likely to fully attain state standards and fully support their designated uses.

Summary of Status of Other Designated Uses for Lakes

I. Fish Consumption

All Maine lakes are designated as **not supporting** fish consumption because of mercury contamination. This statewide advisory includes a consumption ban for pregnant women, nursing mothers, women who may become pregnant, and children under 8 years of age (see pages 8 & 9 for full details).

II. Secondary Contact

Secondary Contact (water activities such as boating) is considered to be **fully supported** as a designated use in all Maine lakes.

III. Drinking Water Supply

Maine lakes **fully support** the designated use of drinking water supply. No drinking water supply closures or advisories have been in effect during the reporting period.

Additional State Designated Uses:

IV. Industrial Process and Cooling Water, Hydroelectric Power Generation, Navigation

These designated uses are considered to be **fully supported** in all Maine lakes.

Threatened Lakes

Threatened lakes are listed at the right by major drainage basins. Threatened status is applied to lakes that have experienced one algal bloom or are categorized as “Threatened” by use of the **Vulnerability Index**. This is an index that takes into account future changes in land use to predict levels of phosphorus in lake waters. The table shows that of the 430 Threatened lakes, 300 remain Unimpaired and are still fully supporting uses.

Threatened Lakes by Major Drainage Basin: number(acreage).

<u>Basin</u>	<u>Threatened Lakes</u>	<u>Unimpaired Threatened Lakes</u> ²
Unknown ¹	2 (37)	2 (37)
Saint John	3 (164)	0 (0)
Penobscot	52 (13,450)	39 (10,444)
Kennebec	77 (21,742)	51 (5,840)
Androscoggin	46 (17,538)	27 (6,056)
East Coastal	113 (25,466)	87 (8,883)
<u>West Coastal</u>	<u>137 (29,448)</u>	<u>94 (7,151)</u>
All Basins	430 (107,845)	300 (38,411)

¹ Not currently assigned to any drainage basin.

² A subset of Threatened Lakes

Current Note of Interest:

A portion of these 300 lakes make up some of the 230 priority lakes recently identified by the DEP as being considered “most at risk” of algal growth because of development in their watersheds.



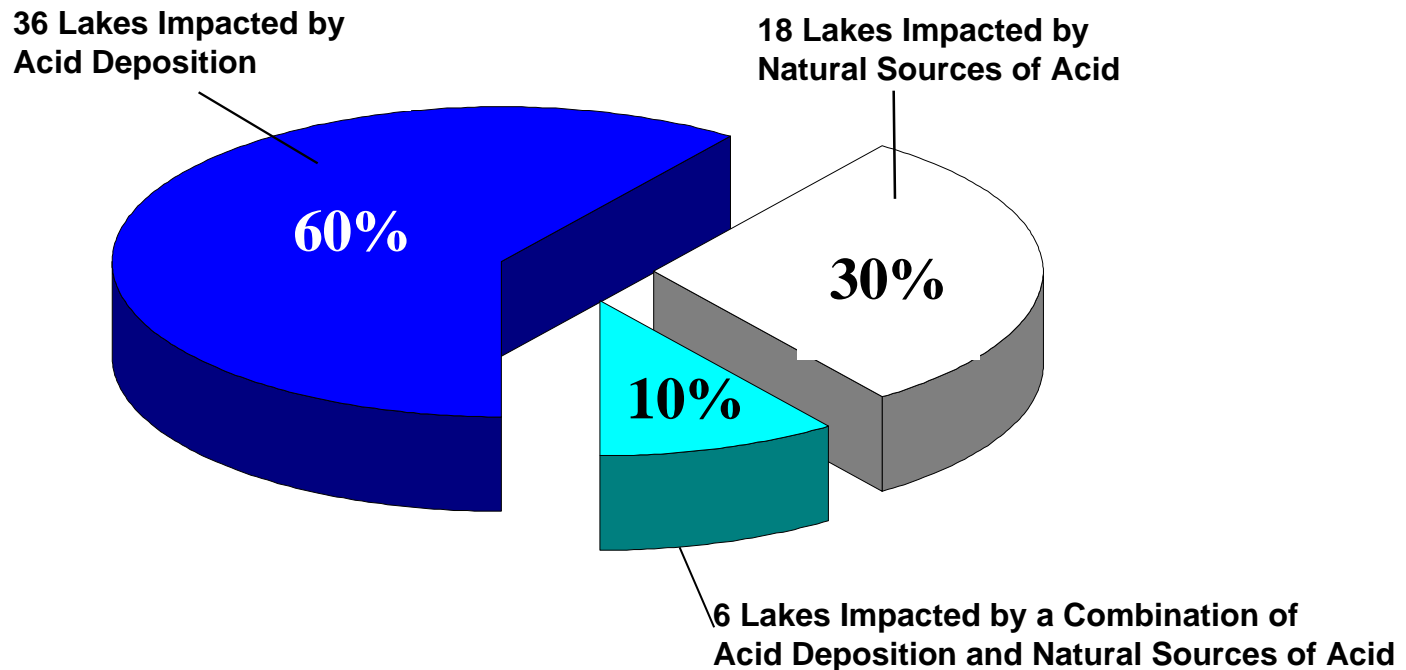
A description of the causes and sources of water quality impairment of Maine lakes by name can be obtained by ordering Chapter 6, Table 5, of Appendix I, of the complete 305(b) from the DEP BLWQ. Specific information concerning threatened lakes and threat sources is listed in Chapter 6, Table 6, of Appendix 1 of complete 305(b).

Acid Effects on Lakes

the previous decade (reprints available from the DEP). A total of 1,005 lakes (an estimated 713,397 acres) have been assessed for acidity. About 60 acidic lakes have been identified comprising a total surface area of 707 acres. Twenty acidic lakes are at least ten acres or greater in size. The remainder are at least 1 acre in size.

Historical data on fisheries is limited for all but a handful of the acidic lakes. Although a number of the acidic lakes are without fish, none have been shown to have lost their fish due to acidification. Thus, all are considered to be fully supporting uses. Many of these types of lakes without fish are small and isolated, or exist at high elevations, with poor breeding habitat.

Sources of Acidity in Maine Lakes



1. *Acidic Deposition and Aquatic Ecosystems*. Chapter 7, Maine—From Regional Case Studies, D. Charles ed. 1991 Springer-Verlog, NY.

Trends

The major threat to maintaining the present lake water quality is changing land use. The greatest change has been the transition from mostly forested land to numerous small residential developments. Control methods include installation and maintenance of agricultural conservation practices, erosion control on private and commercial properties, and reduction of shoreland zone groundwater pollution. Awareness of the need for effective forestry management is also increasing in Maine.

